



The role and the social interest of the over the counter medicines

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Abstract

Background over the counter medicines are products considered of social good that require proper management.

Objective the objective is to provide elements that encourage the continuous review of the list available of medicines under the over the counter medicines category.

Methodology: from electronic sources, published articles related to the key words were identified, those documents necessary to develop this work in several sections were selected for convenience.

Results: there are several denominations referring to the concept of over the counter medicines, such as non prescription, drugs of non medical use and behind the counter medicines. Those medicines represent significant sales, they can be purchased at several commercial establishments, including community pharmacies and the delivery rates vary from place to place. People must perform actions that involve handling, storage and use, which must be present to maintain the efficacy, quality and safety of the products. Due to the easy access of medications, people can practice self-medication for various conditions and which depending on social, cultural, economic, and political factors. Side effects (drowsiness, anxiety, tachycardia) or adverse reactions (bleeding, miscarriage), poisoning or even death can occur at any time, also the use of over the counter medicines can delay the cure or complicate some particular situations. Interdisciplinary (medicine, pharmacy, social work) and inter-sectoral (pharmaceutical companies, authorities, social media, mass media, communities) work, education for health, research and monitoring of this social phenomenon is required.

Conclusions Although over the counter medicines seek to facilitate the well-being of people at an apparently lower economic cost, their social role seems to be distorted due to commercial practices that place the drug as a consumer good that puts people at risk of deteriorating their status of health. It is necessary to improve mechanisms helping the adequate use of over the counter medicines.

Keywords: over the counter, medicines, health, factor, social, role

Introduction

Medicines are health resources that are available to different populations in different parts of the world and some of them require a prescription to be acquired, but others do not^[1, 4].

Although drugs are a social consumer good and are marketed through advertising campaigns that can sometimes provoke and encourage consumption^[4]; however, it should not be forgotten that they have some peculiarities that distinguish them from other products. In this sense, it is emphasized that there are ethical, scientific, technical and legal aspects that regulate their production, promotion, pricing, distribution, storage and demand (drug's life chain) by the actors involved; in addition to having an important social role in the populations^[4, 6].

That is why people have different preconceptions about what a drug is and about all the factors involved in the drug's life chain. Hence, some people may think that over the counter medicines are less dangerous because they have that category or worse even if they think that over the counter medicines are harmless^[4, 7] and therefore do not necessarily require the mediation of a professional in health^[3, 8, 9].

However, there are several aspects that are taken into account to locate a drug in the category of over the counter medicine, those reasons must have been contemplated by the health

regulator of a country; among them are the clinical arguments, such as the following^[4, 5, 10]: a) medications need to be safe, effective and of high quality, b) medicines must be used for a short time, c) those kind of medicines treat minor common symptoms or minor illnesses (ailments), d) medicines that have wide therapeutic margin or that the doses to be used are not close to the doses that can cause toxicity or serious damages and e) medicines that do not generate addiction.

For some societies, commercial aspects that seek to lower drug prices may also be considered so that some groups of people with economic limitations can access them; nevertheless, in general, the population must have sufficient educational preparation to allow the use of medicines without compromising their integrity^[5, 11, 14].

So that people use over the counter medicines to address several conditions that affect their health without professional supervision^[15]. In occasions, for some people it becomes in a good opportunity due to they do not have the time because have excessive work or little spare time to attend the consultation with a medical professional^[16, 19]. Although this seems to be a mechanism considered low cost^[3, 11, 14, 17, 19, 21] which can decongest the highest levels of health centers^[5, 22] and which in theory favors individual self-care in each person through their active participation in all aspects that affect their

health status^[4]; however, and at the same time, it can generate other consequences in various fields, among which the following are mentioned: a) manifestation of side effects or adverse reactions^[13, 23, 25], b) improper practices of recommending the medication to other people, specially family and friends or they can do the self medication^[26], c) the inappropriate storage and disposal of medicines at home, with consequent social and environmental damages^[26] and d) inadequate use of medication respect to quantity or duration^[3].

For this review work, articles of interest were searched through electronic access to various sources, such as Embase, Medline, Science direct, Proquest, Pub Med, Ebscohost, Springer, Scielo, Wiley online library and for convenience, those that allowed to organize the development of this paper.

The main objective of the document is to expose the factors that show the need for a continuous review of the factors related to the benefits and the consequences of various aspects in a society that allows people to have unrestricted access to over-the-counter medicines and in this way be aware of what should be their role and interest in that population.

The document is structured by the following sections: a) General aspects of over-the-counter medicines, b) over-the-counter medicines risks, c) prevention measures to minimize these possible risks and d) some final reflection are presented.

A) Overview of over the counter medicines

Known names for over-the-counter medicines are products that do not require a prescription or prescription drugs for non-medical use^[3, 10, 22, 27]. It has also been reported are medicines to treat minor health problems^[28, 29] or acute ailments^[30].

In the last century, the World Federation of Drug Manufacturers' Associations, a non-governmental organization related to the World Health Organization and representative of the producers and distributors of over-the-counter medicines^[10], which is currently the World Self Medicine Industry WSMI; proposed the classification of prescription and non-prescription drugs with the intention of regulating the commercial sale of medicines^[4].

Over the years these drugs have grown in availability and widespread use by the population^[9, 22] to treat more than 450 medical conditions^[10]. The percentage of over the counter medicines that are dispensed in a community pharmacy varies from place to place and it may sometimes have been recommended previous by a physician or those medicine is part of a therapy that was established time before or maybe that person receives in the community pharmacy the service of follow-up pharmacotherapeutic^[10, 30, 31].

It is recognized that over the counter medicines can be acquired in community pharmacies, because these primary health care centers are generally located near people's homes, so that the person moves to the pharmacy in easy way^[11, 13, 28] or asks for an express delivery medication by phone consultation^[10] or also through electronic purchase requests^[29].

However, a person can also buy these medicines in other places such as supermarkets, macrobotics, bars and even in restaurants; with the aggravating factor that in these places, there is no qualified professional (pharmacist) who can assure

handling and storage of medicines under appropriate conditions (temperature, humidity, light, expiration dates, packaging, labeling, control the falsified products) before the sale^[3, 26, 32, 37].

In 2015, it was reported that in the United States of America the market for over the counter medicines amounted to \$ 40 billion, which tend to increase the out-of-pocket expenses of users, who must allocate an important financial item to address issues of acquisition of health related products^[26, 28]. In addition, another example is China, where it is said that over the counter medicines can contribute up to 50% of the sales of a community pharmacy^[39].

It is expected that the use of over the counter medicines will be safe and effective under appropriate conditions and that is why the user is required to recognize the symptoms of a minor problem and later can select the right over the counter medicine, besides that person must know the doses, frequency, duration of treatment, adverse effects and contraindications^[13], which generally are detailed in the instructions inserted in the secondary packaging of the medication; occasionally, the person should know when to seek help from a health professional^[9, 12, 23, 40, 41].

That is why it is important for people to consider all these aspects, as well as the trademark and the price of the drug that may catch them^[14, 39]. It is mentioned the particular case of senior students of Pharmacy in the north of Ireland, who are out of the ordinary, since they take into account the effectiveness tested to select a drug the over the counter medicine and leave of last factor, which concerns to the influence of advertising^[42].

It is also mentioned that over the counter medicines, allows people to perform what is known as self medication^[3, 11, 20, 29, 30, 37, 43, 47], which can cause an irrational use of medicines (almalak 2014,). Self-medication has a global prevalence of between 8 and 11%^[4] with percentages that decrease or increase up to 60 or 80% depending on the place^[10].

Self-medication can be categorized as responsible when the person knows the necessary aspects (recognizes symptoms, knows the use, knows the risks) that allow the proper use of medicines^[10] or in cases where the opposite happens and much less that it tries to perform self-prescription with medicines that need a prescription, trying to medicalize any aspect of daily life^[4].

Among the main over the counter medicines that are used in greater quantity by the people and considering the therapeutic group, it is mentioned for example the medicines to treat affections of the respiratory, digestive, gynecological, dermatological, circulatory and nervous system^[39, 48, 49]. It is possible to find medicines without prescription of herbal origin or nutritional supplements^[19, 50] or natural products^[23, 51].

Specifically, there are over the counter medicines such as antihistamines against allergies^[44, 52, 53], products to treat colds^[7, 10, 13, 21, 42, 54, 56] or anti-inflammatory drugs against inflammation^[10, 23], analgesics against pain^[3, 4, 9, 10, 19, 23, 27, 29, 42, 44, 45, 46, 53, 57, 60], decongestants^[18, 53], against vomiting or as supplements in the form of vitamins^[13, 19, 44, 61, 62], drugs that control heartburn^[4, 10, 38, 54, 63, 64], nicotine replacement therapy^[65], oral contraceptives^[11] and laxatives^[22, 23, 40], among others.

For some people, the fact that a drug is freely available and that does not require a prescription could cause the false impression that they are medicines that have to be less careful [8, 55, 66], while others prefer for security reasons to buy drugs from behind the counter only at pharmacies [10, 37, 54], where these people can receive the assistance or guidance of a professional in Pharmacy [4, 8, 67].

This is a very complex phenomenon in which the behavior of people against over the counter medicines is influenced as varied by aspects of the socio-economic context as the accessibility or supply of drugs, educational factors such as knowledge and skills, practices or attitudes related to culture [4, 10, 11, 16, 18, 19, 37, 40, 42, 49, 55, 66, 68, 70].

b) Risks about the use of over the counter medicines

Although at any time, all people may be exposed to a risk factor that generates an adverse event due to the use of a drug or the use of that drug concomitantly with other medicines (such as the over the counter medicines) or some substances such as food, plants and others; the truth is that there are some populations that are more susceptible to suffer those consequences that can affect the health and for some of them, it can be more serious than for others; among these people are older adults, pregnant women, children or people who are polimedicated [23, 50, 52, 71, 76] and adolescent people [26].

There is, for example, the case of drugs that are used to treat allergies or colds [21], among them are antihistamines that can cause sleep, therefore, those people who need to be awake or be in alert state, they must be careful with the use of these products [52] so as not to suffer accidents that can be fatal.

People may have the distorted conception that over the counter medicines do not require as careful and therefore they do not take as many important aspects that allow appropriate use of the drug [9, 13, 55, 77], but they can consider various aspects for the decision making regarding the use of a medicine from suggestions of family and friends, commercial advertising, particular aspects of the route of administration of the medicine, price, prior use in a situation similar to the current one and sometimes lend less importance to the scientific evidence related to that medicine [42].

One of the actions that people take from the over the counter medicines is self medication [3, 11, 20, 29, 30, 45, 78], which becomes a factor of risk that at the same time favors the occurrence of intoxication [5], which can end with the death of the person [79], whether intentional or accidental. This poisoning can occur through the use of doses higher than the recommended therapeutic doses [25, 80, 81], a situation that has been more evident in men than in women [11] since overdose can generate more serious adverse reactions [9, 73, 82, 84].

When for example it is an older adult person who may have more complementary therapies (herbal, natural, nutritional supplements); that risk may be even more important [23]. Although it is also generally mentioned that self-medication prevails not only in older adults but also in university students [7, 42], women and health professionals [10, 85].

Likewise, there are reports of up to 178,000,000 hospitalizations due to adverse events related to over the counter medicines [10, 75] and complications of diseases can occur due to the lack of medical supervision since situations are not adequately addressed [86]. In this case, the use of over

the counter medicines to treat fever [57, 87] or the use of products to treat anxiety, agitation, sleep disturbances or depression [88], as well as symptoms of stress (headache, stomach pain, neck or back pain) perceived [89].

Acetaminophen is a drug that can cause liver damage but there are people who are unaware of important data that help them with their proper use [55, 90, 91] or as well as the case of increasing concentrations of calcium in blood due to the overdose of vitamin D [61].

High-care medications such as anti-coagulants which avoiding blood clots can interact with over the counter medicines [72], so that the person may have bleeding problems that are life-threatening, especially in people who have important risk factors, such as people who have several drugs (anti-inflammatory), other therapies as St. John's wort or other associated diseases, such as heart disease, arthritis, diabetes.

Additionally, people who mixture over the counter medicines can put them in a situation to suffer consequences that are similar to those that occur with illicit drugs, such as psychosis, tachycardia, convulsions and agitation. The combination of over-the-counter drugs (analgesics, sedatives, stimulants, anxiolytics) with other drugs (alcohol, marijuana, ecstasy, cocaine) can increase the likelihood of major harm [14, 18, 27].

Under special conditions such as during pregnancy, the woman may experience some minor symptoms, where it is recommended to use some free products, which should always be used with caution; there are other medicines from observational safety studies, which do not recommend the use of a particular drug in pregnant women, including non steroidal anti-inflammatory drugs such as ibuprofen that can cause damage to the fetus heart or miscarriage. If a woman acquires it from over the counter medicines and it is used inappropriately, this increases the potential risks for woman and the fetus [62, 92].

There are medicines that must be used with caution and with a medical prescription, but which can be purchased under the modality of over the counter medicines in certain geographic locations, such as antibiotics [7, 11, 21, 93, 94]; this fact causes that the improper use to treat conditions that are not recommended with these medicines can favor the resistance of the bacterias to these products [10, 95]. Although authorities attempts have also been made to implement measures through the requirement of a medical prescription to avoid this misuse, antibiotics in some parts continue to be sold as if they were over the counter medicines [28].

Also, the codeine that is used against dry cough, in some people can become a substance of abuse [3, 84] with is a social problem or when a person is admitted to a hospital, he or she can may omit therapies used from the purchase of over the counter medicines because they do not consider them as part of their medication therapy [10, 96] with is a clinical and social problem.

c) Prevention measures to minimize the risks of the use of over the counter medicines

It is necessary to implement measures to reduce the risks associated with the indiscriminate use of over the counter medicines, among which are mentioned the following:

Pharmacist can apply decision models and implement actions that help people with the use of over the counter medicines

whose can potentially harm them [4, 6, 7, 11, 12, 13, 18, 28, 42, 54, 63, 74, 85, 96, 99]. Pharmacist can identify various problems related to medications such as: inadequate self medication, duration of treatment with medications, potential adverse reactions, use of erroneous drugs and others [29, 100]. In some places around the world (Canada, UK, Swiss, USA), pharmacist can prescribe some kinds of over the counter medicines for minor ailments, besides other things in order to improve a better use of them [67].

It is very important to maintain a constant disclosure regarding the possible risks due to the inappropriate use of over the counter medicines through the use of different mechanisms, among them social networks, the use of technological devices or the mass media [3, 7, 26, 52, 66, 85, 70] through the coordination of different professionals (pharmacist, doctor, nurse, social worker) who can work about that.

Continuous education activities should be carried out involving the population regarding all necessary and sufficient aspects (differentiating minor common symptoms, making rational use of medications, discerning when to consult with the physician or pharmacist, reading labels or instructions for use of the drug) to allow the safe and adequate use of over the counter medicines [11, 43, 66, 101]. This implies going beyond the possible access of people to the commercial advertisements, pamphlets or written material that are inserted in the secondary packaging (boxes) of the drug [4, 11, 40, 57, 102] and that must be in a written in a non technical language in order that it could be easily understood by anyone [12, 81, 103].

Campaigns should be carried out to collect unused medicines at home, since a significant number of them come from the acquisition of over the counter medicines; these should be handled and treated appropriately to achieve a correct disposal of drugs [10, 26].

Awareness campaigns for authorities, health professionals, pharmaceutical companies, shopping centers and the general public; on the moderate and appropriate use of over the counter medicines [3, 4, 6, 10, 15, 89].

Research is required through various studies (pharmacoepidemiology, pharmacovigilance, pharmacoconomics) to help control the use of over the counter medicines [14, 104], which show that they are safe and effective for people in a specific society [5].

Measures should be implemented to control and supervise processes carried out in places where over the counter medicines are marketed, so that sales are restricted only to those that demonstrate that they meet adequate conditions for the handling, storage and control of medicines under that category [4, 101].

Final reflections

Evidence should be reviewed to demonstrate the social costs and benefits of the over the counter medicines and discourage the claim to try to resolve any of the issues that people face in everyday life through the use of medicines.

The role of health authorities in adequately monitoring where the over-the-counter medicines are sold, there must be evidence those medicines are safe, efficient and effective; which do not put the person at any kind of risk because that would limit the amount of over the counter medicines.

Pharmaceutical companies may contribute to the creation of

mechanisms to educate people about over the counter medicines and to determine the influence of advertising campaigns on those products.

An educated and informed people thorough health education will always be able to participate in the complex process of taking care about their health, so that person will be able to elucidate when it is appropriate to go to a specialist in Medicine or Pharmacy; depending on each particular situation.

Professionals in Pharmacy carry out their work of advising the appropriate medicines for common minor symptoms of the people, implement the pharmacotherapeutic follow-up of the patients, investigate all aspects related to the supply of over the counter medicines, especially those factors that allow to identify in fact in a certain society, medicines that are safe, effective and efficient.

It could be necessary to reduce the use of over the counter medicines available by different populations, based on the fact that exist a largest number of non-pharmacological measures related to healthy lifestyles (health promotion, self-care, disease prevention), such as exercises, nutrition, attitudes, others; which can be similar efficient as them.

The facility to buy over-the-counter drugs become a factor that interrupts the process of therapeutic adherence in people, where the consumer decides which over-the-counter product uses and assumes the role of several health professionals, this situation has aspects that can be criticized from the political, social, economic and ethical point of view.

Conclusions

Over-the-counter medications started with economic purposes in search of benefits for people, but over time these objectives continue to prevail with an imbalance between benefits and risks. Although a large number of minor ailments can be treated with these medications, aspects that maintain the safety of the products are not controlled. People must have health education to make a rational use of over the counter medicines or they are exposed to events that can affect their health. Different actors can participate actively by implementing mechanisms that help to monitor, control, record and disclose aspects related to the proper use of over the counter medicines, so that their role and social interest is always the welfare of people.

References

1. Chai G, Governale L, McMahon A, Phillip J, Staffa J, Murphy D. Trends of outpatients prescriptions drugs utilization in US children, 2002-2010. *Pediatrics*. 2012; 130(1):23-32.
2. Votova K, Blais R, Penning M, Maclure M. Polypharmacy meets polyherbace: Pharmaceutical, over the counter and natural health product use among Canadian adults. *Canadian Journal of Public Health*. 2013; 104(3):e222-e228.
3. Wright J, Bond C, Robertson H, Matheson C. Changes in over the counter drugs misuse over 20 years. perceptions from Scottish phamacists. *Journal of Public Healh*. 2015; 38(4):793-799.
4. Dahir C, Hernandorena C, Chagas L, Mackern K, Varela V, Alonso I *et al*. Self medication: a key to the rational

- use of medicine. *Evid Act Pract Amb*. 2015; 18(2):46-49.
5. Vargas E, Castro J. Considerations for drug marketing in Costa Rica. *National Management Journal*. 2012; 3(1):81-92.
 6. Marín A. Medicines dispensing in big pharmacies in Chile: ethical analysis about pharmaceutical chemist profession. *Bioethical Journal*. 2017; 23(2):341-350.
 7. Almalak H *et al*. Students attitude towards use of over the counter medicines during examen in Saudi Arabia. *Saudi Pharmaceutical Journal*. 2014; 22:107-112.
 8. Aoyama I, Koyama S, Hibino H. Self medication behaviours among Japanese consumers: sex, age, and SES diferences and caregivers's attitude towards their children's health management. *Asia Pacific family Medicine*, 2012, 11:7
 9. Bower A, Landreth S, Taylor V. Ovet the counter vs prescription medications: are consumer perceptions of the consequences of drug instruction non compliance different? *International Journal of Consumer Studies*. 2013; 37:228-233.
 10. Ruiz A, Pérez A. Self medication and related terms: a conceptual reflection. *Health Sciences Journal*. 2011; 9(1):83-97.
 11. Wazaify M, Al-Bsoul A, Abu E, Tahaineh L. Societal perspectives on the role of community pharmacists and over the counter drugs in Jordan. *Pharm World Sci*. 2008; 30:884-891.
 12. Blom L, Krass I. The role of pharmacy in patient education and counselin. *Patient education and Counseling*. 2011; 83:285-287.
 13. Azhar M, Gunasekaran K, Kadirvelu A, Gurtu S, Sadasivan S, Kshatriya B *et al*. Self-medication: awareness and attitude among Malaysian urban population. *International Journal of Collaborative Research on Internal Medicine & Public Health*, 2013.
 14. Fingleton N, Watson M, Duncan E, Matheson C. Non-prescription medicine misuse, abuse and dependence: a cross-sectional survey of the UK general population. *Journal of Public Health*. 2016; 38(4):722-730.
 15. Will C, Weiner K. The drugs don't sell: DIY heart health and the over the counter statin experience. *Social Science and Medicine*. 2015; 131:280-288.
 16. Jain S, Malvi R, Kumar J. Concept of self medication: A review. *International Journal of Pharmaceutical & Biologist Achieve*. 2011; 2(3):831-836.
 17. Ferner R, Beard K. Over the counter medicines: proceed with caution. *Bmj*. 2008; 336(7646):694-696.
 18. Cooper R. Surveillance and uncertainty: community pharmacy responses to over the counter medicine abuse. *Health & social care in the community*. 2013; 21(3):254-262.
 19. Gobina I, Välimaa R, Tynjälä J, Villberg J, Villerusa A, Iannotti R *et al*. The medicine use and corresponding subjective health complaints among adolescents, a cross-national survey. *Pharmacoepidemiology and drug safety*. 2011; 20(4):424-431.
 20. Yousef A, Al Bakri A, Bustanji Y, Wazaify M. Self medication patterns in Amman, Jordan. *Pharm World Sci*. 2008; 30:24-30.
 21. Sklyros E *et al*. Self medication with antibiotics in rural population in Greece: a cross sectional multicenter study. *BMC Family Practice*. 2010; 11:58.
 22. Llor C, Cots J. The sale of antibiotics without prescription in pharmacies in Catalonia, Spain. *Clinical Infectious Diseases*. 2009; 48(10):1345-1349.
 23. Yeen L, Vitry A, Semple S, Esterman A, Luszcz M. Self medication with over the counter drugs and complementary medications in South Australia 's elderly population. *BMC Complementary and Alternative Medicine*. 2009; 9:42.
 24. Koushede V, Holstein B, Andersen A, Ekholm O, Holme E. Use of over the counter analgesics and perceived stress among 25-44 years old. *Pharmacoepidemiology and drug safety*. 2010; 19:351-357.
 25. Koffeman A *et al*. High risk use of over the counter non steroidal anti inflammatory drugs: a population based cross sectional study. *Br J Gen Pract*. 2014, e191-e198.
 26. Kinrys G, Gold A, Nierenberg A. Proper drug disposal: Studying a solution to household prescription and over the counter drug abuse. *Journal of Drug Abuse*. 2016; 2(2):18.
 27. Benotsch E, Koester S, Martin A, Cejka A, Luckman D. Intentional misuse of over the counter medications, mental health, and polysubstance use in young adults. *J Community Health*, 2014; 39:688-695.
 28. Wirtz V, Herrera J, Santa Ana Y, Dreser A, Elseviers A, Vander A *et al*. Analysing policy interventions to prohibit over the counter antibiotic sales in Latin American countries. *Tropical Medicine and International Health*. 2013; 18(6):665-673.
 29. Eickhoff C, Hämmerlein A, Griese N, Shultz M. Nature and frequency of drugs related problems in self medication over the counter drugs in daily community pharmacies in Germany. *Pharmacoepidemiology and drugs safety*, 2012; 21:254-260.
 30. Barbero A, Pastor R, del Arco J, Eyaralar T, Espejo J. Demand for medicines without a prescription. *Primary care*. 2006; 37(2):78-87.
 31. Wirth F, Tabone F, Azzopardi L, Gaurci M, Zarb M, Serracino A *et al*. Consumer perception of the community pharmacist and community pharmacy services in Malta. *Journal of Pharmaceutical and Health Services Research*. 2011; 1(4):189-94.
 32. Trajanovska M, Manias E, Cranswick N, Johnston L. Use of over-the-counter medicines for young children in Australia. *Journal of paediatrics and child health*. 2010; 46(1-2):5-9.
 33. Aronson JK. From prescription-only to over-the-counter medicines PoM to P: time for an intermediate category. *British medical bulletin*. 2009; 90(1):63-69.
 34. Watson M, Cleland J, Bond C. Simulated patient visits with immediate feedback to improve the supply of over-the-counter medicines: a feasibility study. *Family practice*. 2009; 26(6):532-542.
 35. Nydert P, Kimland E, Kull I, Lindemalm S. Over-the-counter drug use estimations within the Swedish paediatric population. *European journal of pediatrics*. 2011; 170(5):583-588.
 36. Hämeen K, Lindell L, Sepponen K, Vainio K, Halonen P, Ahonen R. Factors associated with medicine use among

- children aged under 12 years a population survey in Finland. *Pharmacoepidemiology and drug safety*. 2010; 19(4):400-407.
37. Brabers A, Van L, Bouvy M, De Jong. Where to buy OTC medications? A cross sectional survey investigating consumers' confidence in over the counter skills and their attitudes towards the availability of OTC painkillers. *BMJ Open*, 2013, 3e03455.
 38. Fidler B, Massachi R. The growing number of over the counter medications influencing prescribing practices. *The Journal for Nurse Practitioners*. 2016; 12(3):161-65.
 39. Ge S, He T, Hu H. Popularity and customer preferences for over the counter Chinese medicines perceived by community pharmacists in Shanghai and Gaungzhou: a questionnaire survey study. *Chinese Medicine*, 2014; 9:22.
 40. Calamusa S *et al*. Factors than influence Italian consumers' understanding over the counter medicines and risk perception. *Patient education and conseling*. 2012; 87:395-401.
 41. Moore A, Crossley A, Ng B, Phillips L, Sancak Ö, Rainsford K *et al*. Use of multicriteria decision analysis for assessing the benefit and risk of over the counter analgesics. *Journal of Pharmacy and Pharmacology*, 2017; 69:1364-1373.
 42. Hanna L, Hall M, Duffy D. Pharmacy students' use on over the counter medicines: a questionnaire study. *Currents in Pharmacy Teaching and Learning*. 2016; 8:289-298.
 43. Brass E, Shay L, Leonard A. Analysis of multiple end points in consumer research in support of switching drugs from prescriptions over the counter status: The concept of end point hierchies. *Clinical Pharmacology and Therapeutics*. 2009; 85(4):369-374.
 44. Ocan M, Obuku E, Bwanga F, Akena D, Richard S, Ogwal J *et al*. Household antimicrobial self-medication: a systematic review and meta-analysis of the burden, risk factors and outcomes in developing countries. *BMC public health*. 2015; 15(1):742.
 45. Fangel J, Gottschau M, Dirk V, Hauskov A, Evald B, Ehlert L *et al*. Association of maternal self medication and over the counter analgesics for children. *Pediatrics*, 2014; 133:e291.
 46. Abula T, Worku A. Self-medication in three towns of North West Ethiopia. *The Ethiopian Journal of Health Development EJHD*, 2017; 15(1).
 47. You J, Wong F, Chan F, Wong E, Yeoh E. Public perception on the role of community pharmacists in self-medication and self-care in Hong Kong. *BMC clinical pharmacology*. 2011; 11(1):19.
 48. Kirian M, Weintraub J. Prediction of gastrointestinal disease with over the counter diarrreal remedy sales records in the San Francisco Bay Area. *BMC Medical Informatics and Decision Making*, 2010; 10:39.
 49. Pereira A, Lizano C, Hernández L. Characterization of minor illness services inquires in 30 metropolitan community pharmacies in Costa Rica. *Pharm Care Esp*. 2016; 18(1):16-27.
 50. Olesen C, Harbig P, Barat I, Damsgaard E. Absence of over the counter medicinal products in on line prescription recrdos: a risk factor of overlooking interactions in the elderly. *Pharmacoepidemiology and Drug Safety*, 2013; 22:145-150.
 51. Cramer H, Shaw A, Wye L, Weiss M. Over-the-counter advice seeking about complementary and alternative medicines CAM in community pharmacies and health shops: an ethnographic study. *Health & social care in the community*. 2010; 18(1):41-50.
 52. Church M *et al*. Risk of first generation H1 antihistamines: a GA2LEN position paper. *Allergy*. 2010; 65:459-466.
 53. Minami T, Esipenko N, Akdeniz A, Zhang B, Isaacs L, Anzenbacher P *et al*. Multianalyte sesing of addictive over the counter drugs. *Journal of the Am Chem Soc.*, 2013; 135:15238-15243.
 54. Simoens S, Lobeau M, Verbeke K, van Aerschot A. Patient experiences of over-the-counter medicine purchases in Flemish community pharmacies. *Pharmacy World & Science*. 2009; 31(4): 450-457.
 55. Wood D, English E, Butt S, Ovaska H, Garnham F, Dargan P *et al*. Patient knowledge of the paracetamol content of over-the-counter OTC analgesics, cough/cold remedies and prescription medications. *Emergency Medicine Journal*. 2010; 27(11):805.
 56. Doherty M *et al*. A randomised control trial of ibuprofen, paracetamol or a combination tablet ibuprofen/paracetamol in community derived people with knee pain *Ann Rheum Dis.*, 2011; 70:1534-1541.
 57. Stosic R, Dunagan F, Palmer H, Fowler T, Adams I. Responsible self medication: perceived risks and benefits of over the counter analgesic use. *International Journal of Pharmacy Practice*. 2011; 19:236-245.
 58. Duong M *et al*. Usage patterns of over the counter vs prescription strength nonsteroidal antiinflammatory drugs in France. *British Journal of Clinical Pharmacology*. 2013; 77(5):887-895.
 59. Kim J, Kwong E, Chung V, Lee J, Wong T, Goggins W *et al*. Acute adverse events from over-the-counter Chinese herbal medicines: a population-based survey of Hong Kong Chinese. *BMC complementary and alternative medicine*. 2013; 13(1):336.
 60. Petersen I, McCrea R, Lupattelli A, Nordeng H. Women's perception of risks of adverse fetal pregnancy outcomes: a large-scale multinational survey. *BMJ open*. 2015; 5(6):e007390.
 61. Lowe H, Cusano N, Binkley N, Blaner W, Bilizikian P. Vitamin D toxicity due to a commonly available over the counter remedy from the Dominican Republic. *J Clin Endocrinol Metab*. 2011; 96:291-295.
 62. Chambers C. Over the counter medications: Risk and safety in pregnancy. *Seminars in Perinatology*. 2015; 39:541-544.
 63. Holtmann G, Bigard M, Malfertheiner P, Pounder R. *International Journal of Clinical Pharmacy*. 2011; 33(3):493-500.
 64. McRorie J, Gibb R, Miner P. Evidence based treatment of frequent heartburn: The benefits and limitations of over the counter medications. *Journal of the American Association of Nurse Practitioners*, 2014; 26:330-339.
 65. Hughes J, Peters E, Naud S. Effectiveness of over the

- counter nicotine replacement therapy: A qualitative review of non randomized trials. *Nicotine and Tobacco Research*. 2011; 13(7):512-522.
66. Jose J, Chong D, Lynn T, Jye G, Jimmy B. A survey on the knowledge, beliefs and behaviour of a general adult population in Malaysia with respect to the adverse effects of medicines. *International Journal of Pharmacy Practice*. 2011; 19(4):246-252.
 67. Mansell K, Bootsman N, Kuntz A, Taylor J. Evaluating pharmacist prescribing for minor ailments. *International Journal of Pharmacy Practice*. 2015; 23(2):95-101.
 68. Mayer S, Österle A. Socioeconomic determinants of prescribed and non prescribed medicine consumption in Austria. *European Journal of Public Health*. 2014; 25(4):597-603.
 69. Eaves E. Just Advil: Harm reduction and identity construction in the consumption of over the counter medication for chronic pain. *Social Science and Medicine*. 2015; 146:147-154.
 70. Mullan J, Weston K, Bonney A, Burns P, Mullan J, Rudd R *et al*. Consumer knowledge about over the counter NSAID's: they don't know what they don't know. *Aust NZJ Public Health*. 2017; 41:210-4.
 71. Arboleda A, Alonso J. Determining factors in erroneous choices when selecting over the counter medications. *Rev. Innovar*. 2010; 20(38):175-190.
 72. Walenga J, Adiguzel C. Drug and dietary interactions of the new and emerging oral anticoagulants. *Clinical Practice*. 2010; 64(7):956-967.
 73. Budnitz D, Lovegrove M, Shehab N, Richards C. Emergency hospitalizations for adverse drug events in older Americans. *The New England Journal of Medicine*. 2011; 365:2002-12.
 74. Chui M, Stone J, Martin B, Croes K, Thorpe J. Safeguarding Older Adults From Inappropriate Over-the-Counter Medications: The Role of Community Pharmacists. *The Gerontologist*. 2014; 54(6):989-1000.
 75. Chui M, Stone J, Holden R. Improving over the counter medications safety for older adults: A study protocol for a demonstration and dissemination study. *Research in Social and Administrative Pharmacy*. 2017; 13:930-937.
 76. Cuzzolin L, Benoni G. Safety of non-prescription medicines: knowledge and attitudes of Italian pharmacy customers. *Pharmacy world & science*. 2010; 32(1):97.
 77. Siponen S, Ahonen R, Kiviniemi V, Hämeen K. Association between parental attitudes and self-medication of their children. *International journal of clinical pharmacy*. 2013; 35(1):113-120.
 78. Arroyo Y, Salas A, Arias F. Trends in mortality from poisoning in Costa Rica. *Revista Costarricense de Salud Pública*. 2014; 23(1):58-62.
 79. Arora S, Roxburgh A, Bruno R, Nielsen S, Burns L. A cross sectional analysis of over the counter codeine use among an Australian sample of people who regularly inject drugs. *Drug and alcohol review*. 2013; 32:574-581.
 80. Mullan J, Weston K, Bonney A, Burns P, Mullan J, Rudd R *et al*. Consumer knowledge about over the counter NSAID's: they don't know what they don't know. *Aust NZJ Public Health*. 2017; 41:210-4.
 81. Hassali M, Shafie A, Al-Qazaz H, Tambyappa J, Palaian S, Hariraj V *et al*. Self-medication practices among adult population attending community pharmacies in Malaysia: an exploratory study. *International journal of clinical pharmacy*. 2011; 33(5):794.
 82. Hopf Y, Watson M, Williams D. Adverse-drug-reaction related admissions to a hospital in Scotland. *Pharmacy world & science*. 2008; 30(6):854.
 83. Nielsen S, Cameron J, Pahoki S. Opportunities and challenges: over the counter codeine supply from the codeine consumer's perspective. *International Journal of Pharmacy Practice*. 2013; 21:161-168.
 84. Klemenc Z, Hladnik Z, Kerns J. Self medication among healthcare and non healthcare students at University of Ljubljana. *Med Princ Pract*. 2010; 19:395-401.
 85. Parikh D, Sattigeri B, Kumar A, Brahmabhatt S. A survey study on use of over the counter drugs among medical students, nursing and clerical of a tertiary care teaching rural hospital. *International Journal of Research in Medical Sciences*. 2013; 1(2):83-86.
 86. Abuya T, Mutemi W, Karisa B, Ochola S, Fegan G, Marsh V *et al*. Use of over the counter malaria medicines in children and adults in three districts of Kenya: implications for private medicines retailer interventions. *Malaria Journal*. 2007; 6(57):10.
 87. Hamann J, Linde K, Schweiger H, Kusmakow O, Förstl H. Over-the-Counter-Drugs for the Treatment of Mood and Anxiety Disorders - The Views of German Pharmacists. *Pharmacopsychiatry*. 2014; 47(03):84-88.
 88. Koushede V, Holstein B, Andersen A, Ekholm O, Holme E. Use of over the counter analgesics and perceived stress among 25-44 years old. *Pharmacoepidemiology and drug safety*, 2010; 19:351-357.
 89. Goyal R, Rajan S, Essien E, Sangsiry S. Effectiveness of FDA's new over the counter acetaminophen warning label in improving consumer risk perception of liver damage. *Journal of Clinical Pharmacy and Therapeutics*, 2012; 37:681-685.
 90. Lee W. Acetaminophen Toxicity: Changing perceptions on a social/medical issue. *Hepatology*. 2007; 46(4):966-970.
 91. Verstappen G, Smolders E, Munster J, Aarnoudse J, Hak E. Prevalence and predictors of over the counter medication among pregnant women: a cross sectional study in the Netherlands. *BMC Public Health*, 2013; 13:185.
 92. Santa Ana Y, Mantel A, Drser A, Leufkens H, Wirtz V. Impact of over the counter restrictions on antibiotic consumption in Brazil and Mexico. *PLoS One*. 2013; 8(10):e75550.
 93. Ecker L, Ruiz J, Vargas M, Del Valle L, Ochoa T. Prevalence of purchase of antibiotics without prescription and antibiotics recommendation practice for children under than five years of age in private pharmacies in peri urban area of Lima, Peru. *Rev Peru Med Exp Salud Publica*. 2016; 33(2):215-23.
 94. Hadi U, van P, Kolopaking E, Zairina N, Gardjito W, Gyssens I. Cross sectional study of availability and pharmaceutical quality of antibiotics requested with or without prescription Over The Counter in Surabaya, Indonesia. *Infectious Diseases*, 2010; 10:203.

95. Hellström L, Bondesson A, Höglund P, Eriksson T. Errors in medication history at hospital admission: prevalence and predicting factors. *BMC Clinical Pharmacology*, 2012; 12:9.
96. Major C, Vinzce Z. Consumer habits and interests regarding non prescription medications in Hungary. *Family Practice*, 2010; 27:333-338.
97. Stone J, Lester C, Aboneh E, Phelan C, Welch L, Cui M. A preliminary examination of over the counter medication misuse rates in older adults. *Research in Social and Administrative Pharmacy*, 2017; 13:187-192.
98. Van Einkenhorst L, N Salema, Anderson C. A systematic review in select countries of the role of the pharmacist in consultations and sales of non prescription medicines in community pharmacy. *Research in Social and Administrative Pharmacy*, 2017; 13:17-38.
99. Lessenger J, Feinberg S. Abuse of prescription and over the counter medications. *J Am Board Fam Med.*, 2008; 21:45-54.
100. Segura P. Headache due to overuse of medicines. *Medical Journal of Costa Rica and Central America*. 2009; 68(590):423-426.
101. Weiss S. Compliance packaging for over-the-counter drug products. *Journal of Public Health*. 2009; 17(2):155.
102. Tong V, Raynor D, Aslani P. Design and comprehensibility of over the counter products labels and leaflets: a narrative review. *Int J Clin Pharm*. 2014; 36:865-872.
103. Pomeranz J, Taylo L, Austin S. Over the counter and out of control: Legal strategies to protect youths from abusing products for weight control. *American Journal of Public Health*. 2013; 103(2):220-225.